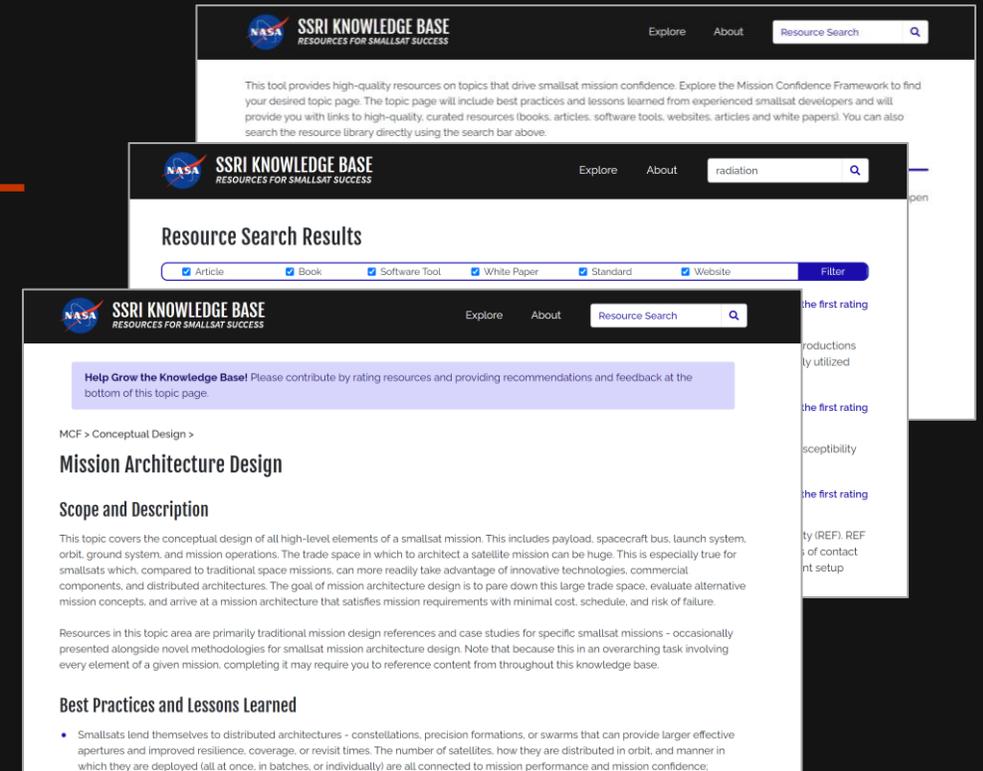


The SSRI Knowledge Base: Updates and Demonstration

NEPP Electronics Technology Workshop
June 17, 2021

Robbie Robertson
Sedaro Technologies



The image shows three overlapping screenshots of the SSRI Knowledge Base website. The top screenshot shows the homepage with the NASA logo, the title 'SSRI KNOWLEDGE BASE RESOURCES FOR SMALLSAT SUCCESS', and navigation links for 'Explore' and 'About'. A search bar is visible on the right. The middle screenshot shows a search results page for 'radiation', with a filter bar below the search bar. The bottom screenshot shows a detailed page for 'Mission Architecture Design' under the 'Conceptual Design' category. It includes a 'Scope and Description' section and a 'Best Practices and Lessons Learned' section with a bullet point about distributed architectures.

Help Grow the Knowledge Base! Please contribute by rating resources and providing recommendations and feedback at the bottom of this topic page.

MCF > Conceptual Design >

Mission Architecture Design

Scope and Description

This topic covers the conceptual design of all high-level elements of a smallsat mission. This includes payload, spacecraft bus, launch system, orbit, ground system, and mission operations. The trade space in which to architect a satellite mission can be huge. This is especially true for smallsats which, compared to traditional space missions, can more readily take advantage of innovative technologies, commercial components, and distributed architectures. The goal of mission architecture design is to pare down this large trade space, evaluate alternative mission concepts, and arrive at a mission architecture that satisfies mission requirements with minimal cost, schedule, and risk of failure.

Resources in this topic area are primarily traditional mission design references and case studies for specific smallsat missions - occasionally presented alongside novel methodologies for smallsat mission architecture design. Note that because this is an overarching task involving every element of a given mission, completing it may require you to reference content from throughout this knowledge base.

Best Practices and Lessons Learned

- Smallsats lend themselves to distributed architectures - constellations, precision formations, or swarms that can provide larger effective apertures and improved resilience, coverage, or revisit times. The number of satellites, how they are distributed in orbit, and manner in which they are deployed (all at once, in batches, or individually) are all connected to mission performance and mission confidence.

Small Satellite Reliability Initiative (SSRI)



Small Spacecraft Systems Virtual Institute (S3VI)



Wikipedia for SmallSats

Strengths of Wikipedia



- Free, publicly available tool
- Go-to starting place for information on a broad range of topics
- Open, collaborative development (crowdsourcing) for continuous growth and improvement

Wikipedia for SmallSats

Strengths of Wikipedia



- Free, publicly available tool
- Go-to starting place for information on a broad range of topics
- Open, collaborative development (crowdsourcing) for continuous growth and improvement

How is the SSRI Knowledge Base Different?

- Primarily providing users with existing, third-party content
- Final moderation by the SSRI, not the user community

Structure

Resource Library

- Third-party content
 - Articles, books, software tools, white papers, standards, and websites
- Access to resource
- SmallSat context
- Ratings

Resource

Structure

Resource Library

- Third-party content
 - Articles, books, software tools, white papers, standards, and websites
- Access to resource
- SmallSat context
- Ratings

Resource

Mission Confidence Framework

Section

Topic

Topic

Topic

Section

Topic

Topic

Topic

- Order, structure, context
- Best practices & lessons learned
- User interfaces for submitting feedback and recommendations

Structure

Resource Library

- Third-party content
 - Articles, books, software tools, white papers, standards, and websites
- Access to resource
- SmallSat context
- Ratings

Resource
Resource
Resource
Resource
Resource
Resource
Resource
Resource
Resource
Resource

Mission Confidence Framework

- Order, structure, context
- Best practices & lessons learned
- User interfaces for submitting feedback and recommendations

Section

Topic

Topic

Topic

Section

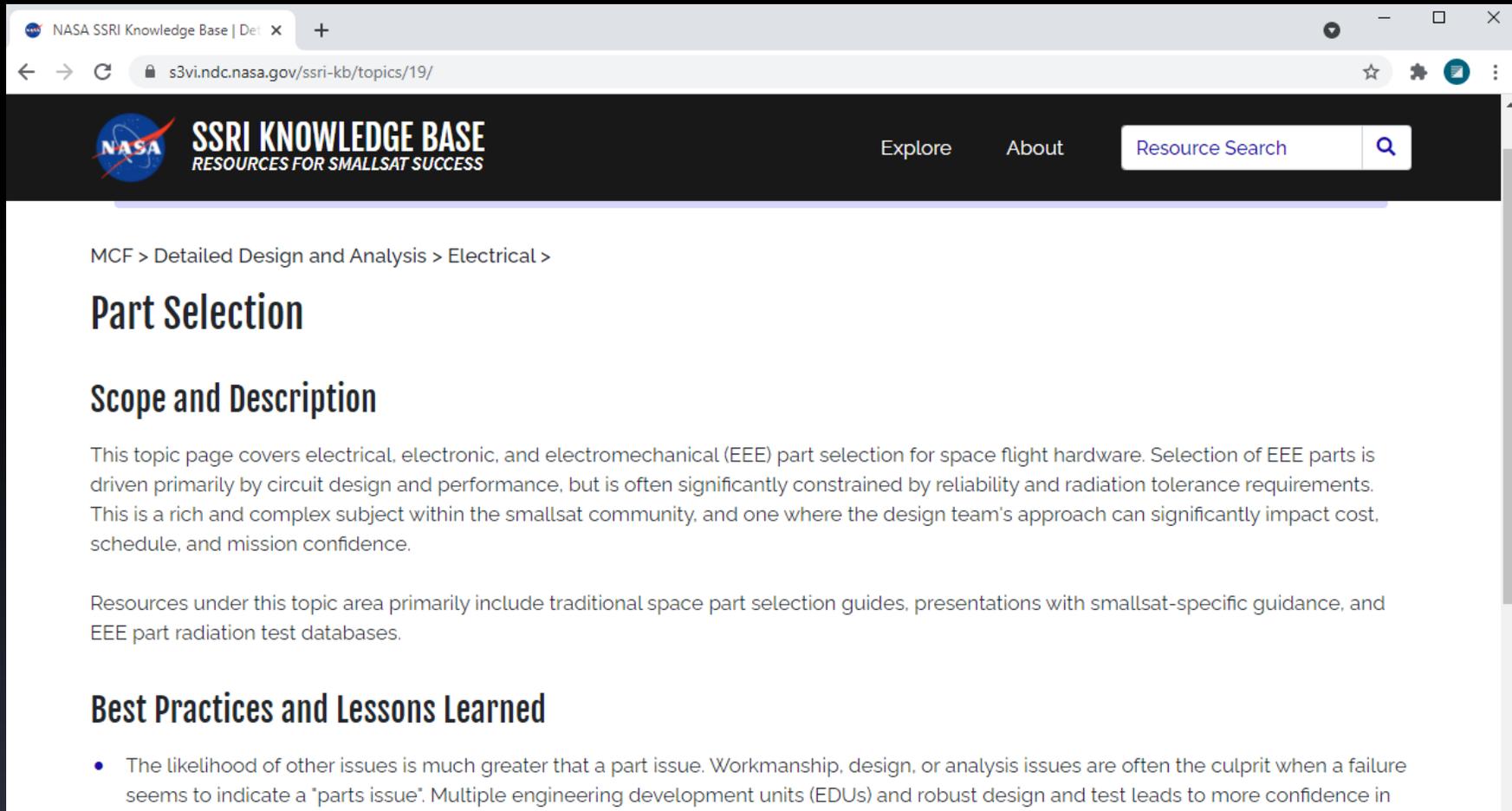
Topic

Topic

Topic

The SSRI Knowledge Base is Live!

(<https://s3vi.ndc.nasa.gov/ssri-kb/>)



The screenshot shows a web browser window with the URL s3vi.ndc.nasa.gov/ssri-kb/topics/19/. The page header features the NASA logo, the text "SSRI KNOWLEDGE BASE RESOURCES FOR SMALLSAT SUCCESS", and navigation links for "Explore" and "About". A search bar labeled "Resource Search" is also present. The main content area displays a breadcrumb trail: "MCF > Detailed Design and Analysis > Electrical >". Below this is the section title "Part Selection" and a sub-section "Scope and Description". The text under "Scope and Description" explains that the page covers electrical, electronic, and electromechanical (EEE) part selection for space flight hardware, noting that selection is driven by circuit design and performance but often constrained by reliability and radiation tolerance requirements. It also mentions that this is a complex subject within the smallsat community. Below this is a paragraph of resources available under this topic area, including traditional guides, presentations, and radiation test databases. The final section is "Best Practices and Lessons Learned", which includes a bullet point stating that the likelihood of other issues is much greater than a part issue, and that workmanship, design, or analysis issues are often the culprit when a failure seems to indicate a "parts issue". Multiple engineering development units (EDUs) and robust design and test leads to more confidence in

The SSRI Knowledge Base is Live!

(<https://s3vi.ndc.nasa.gov/ssri-kb/>)

- 16 topics completed

The SSRI Knowledge Base is Live!

(<https://s3vi.ndc.nasa.gov/ssri-kb/>)

- 16 topics completed
- 24 topics in expert review

The SSRI Knowledge Base is Live!

(<https://s3vi.ndc.nasa.gov/ssri-kb/>)

- 16 topics completed
- 24 topics in expert review
- New development effort in Q3 2021
 - 18 more topics
 - API
 - Improved crowdsourcing interfaces
 - Searchable, sortable best practices with ratings



SSRI KNOWLEDGE BASE
RESOURCES FOR SMALLSAT SUCCESS

Demonstration



Try out the SSRI Knowledge Base at:

<https://s3vi.ndc.nasa.gov/ssri-kb/>

Please review and contribute content!

Have questions? Want to get involved?

Robbie Robertson

robbie.robertson@sedarotech.com

(781) 573-3276